MEMORY KEYS: MAKING THE MOST OF YOUR CALCULATOR

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Using calculators in the middle school mathematics classroom is on the increase, albeit slowly. Useful ideas and activities, involving calculators, are found monthly in several journals. The list of books and pamphlets on using calculators is growing each year. Almost all major publishers include calculator activities in their textbooks. The two major factors in increasing the use of calculators in the classroom are 1) convincing teachers that there is a place and need for calculators in the classroom, and 2) obtaining funds to provide the same type and model of calculator for each student in each classroom.

There is some evidence that more and more elementary school children are using calculators in the classroom. There is much evidence of the increase in available material for these children. Assuming that more and more children will be arriving in the middle school mathematics classroom with a fairly good knowledge of the calculator and its use, it will be necessary for teachers at this level to continue to provide appropriate calculator activities. Not only will it be necessary to provide more applications of the use of the calculator, but it will be very appropriate to help students make the most efficient use of the calculator. A major part of efficient use of the calculator includes using the memory keys.

Literature concerning the use of memory keys is very sparse. It is difficult to find articles which encourage teachers to help students use the memory keys. More prevalent, but still scarce, are articles which suggest activities in which memory keys could be used. Coburn (1987) and Bright (1989) describe interesting sample activities using memory keys.

Assuming that middle school teachers will make use of the simple four-function calculator with memory keys, as used in elementary school classrooms (scientific, engineering, and other specialized calculators are not needed at this level), instruction and appropriate activities of memory key usage seems warranted. The use of the calculator reduces the need for paper and pencil calculations; the use of memory keys further reduces this need. Thus, memory keys provide for more

efficient use of the calculator. Furthermore, the use of the calculator helps students "think through" an activity or problem before punching in the keystrokes. The use of the memory keys provides even more opportunities to think of the most efficient way of performing complex computations.

In this article, several examples of complex computations and problem solving activities are investigated in order to provide middle school teachers with ideas for using the memory keys and helping student become more efficient users of the calculator. It would be best if all students use the same type and model of calculator since the keystrokes for the memory keys are slightly different for various brands of calculators. For the examples in this article, the Sharp EL-211 is used. Even so, there may be more than one way to execute the keystrokes for any one example. Once teachers and students become familiar with memory key usage, different procedures can be investigated, shared, and discussed in order to strive for the most efficient use of the calculator.

The first set of examples involve complex computations. The examples are given and keystrokes follow. A short discussion or explanation of the keystrokes are given where deemed necessary.

a) $(152 \times 7.41) + (76 \times 6.73) + (45 \times 2.55) = ?$

Enter	152 [x] 7.41 [=] [M+]	Perform the multi-application and place the result in M+.
	76 [x] 6.73 [=] [M+]	Add the second product to M+.
	45 [x] 2.55 [=] [M+]	Add the third product to M+.
	[RCM] (= 1752.55)	Push the RCM key to obtain the three products which were added together in memory.

Using the memory keys in this example avoids the use of paper and pencils altogether.

b) $(59 + 81) \times (97 + 32) = ?$

Enter 59 [+] 81 [=] [M+]	Enter the sum in M+.
97 [+] 32 [=] [×] [RCM]	Find the second sum and multiply by the first sum which is in memory.
[=] (18,060)	

c) $(781 - 232) - (744 \div 24) = ?$

Enter 781 [−] 232 [=] [M+]	Find difference and store in memory
744 [÷] 24 [=] [M−]	Find quotient and store in M−.
[RCM] (= 518)	The subtraction is performed in memory and pushing RCM displays the result.

The M+ key stores results in memory and also adds a quantity to memory. The M− key places a quantity in memory that will be subtracted from what is already in memory.

d) $$\frac{30 \times 4}{(8 + 4) \times (11 + 9)} = ?$$

It is usually more efficient to start with the denominator when a fraction is involved.

Enter 8 [+] 4 [=] [M+]	
11 [+] 9 [=] [×] [RCM] [RCM]	Second sum is and multiplied by first sum which is in memory. Pushing RCM twice brings the first sum to the display and then erases everything from memory.

[=] [M+]	The product is now placed in the empty memory.
30 [×] 4 [=] [÷] [RCM]	The numerator is computed and divided by the denominator which needs to be recalled from memory.
[=] (0.5)	

These examples illustrate the types of computation that may be necessary to perform in order to solve a practical problem. The keystrokes shown are not the only keystrokes needed to obtain the answer. Other keystrokes may work just as well. The examples serve only to show how memory keys can be used to obtain results.

Perhaps the most important use of the calculator, and the memory keys, is in problem solving. Much has been written concerning the use of calculators in problem solving, but very little information appears in the literature concerning the most efficient ways of using the calculator in problem solving – using the memory keys. Again, encouraging students to use the memory keys forces (provides an incentive for) them to not only use the calculator to perform the computations, but also to use the calculator as efficiently as they can. The following examples illustrate the use of memory keys in problem solving. Remember, pushing RCM twice displays the contents of memory and clears the memory. The keystrokes for each example are given. Can you find a more efficient use of the calculator for each example?

a) A field goal in basketball counts 2 points. A free throw counts 1 point. The CAGERS scored 70 points in one game. They made 26 field goals. How many free throws did they make?

Enter 70 [M+]

26 [×] 2 [=] [M–]

[RCM] (= 18)

b) It costs 25 cents to mail a letter and 15 cents to mail a postcard.

1) How much does it cost to mail 6 letters and 5 postcards?

2) I spent \$3.95 and wrote to several people. How many letters did I mail if I mailed 8 postcards?

i) Enter 6 [×] .25 [=] [M+]

5 [×] .15 [=] [M+]

[RCM] (= \$2.25)

ii) Enter 3.95 [M+]

8 [×] .15 [=] [M−]

[RCM] [÷] .25 [=] (11)

c) I bought 3 cans of dog food at 39 cents a can and 5 cans of soup. I received \$2.68 change from a 5 dollar bill. What was the cost of each can of soup?

Enter 5.00 [−] 2.68 [=] [M+]

.39 [×] 3 [=] [M−]

[RCM] [÷] 5 [=] (.23)

d) A job pays \$5.28 per hour plus overtime for more than 40 hours. The pay for 42 hours is \$227.04. What is the pay for 46 hours?

Enter 227.04 [M+]

5.28 [×] 40 [=] [M−]

[RCM] [RCM] [÷] 2 [=] [×] 6 [=] [M+]

5.28 [×] 40 [=] [M+]

[RCM] (= 258.72)

In one seventh-grade classroom, after the teacher had shown the students how to use the memory keys when solving problems, one student suggested that memory keys could be used to add two or more fractions. He found that 1/2 + 1/4 could be computed by using the following keystrokes:

1 [÷] 2 [M+] 1 [÷] 4 [M+] [RCM] (= 0.75 or 3/4). Once taught how to use the memory keys, many students will seek new ways to use them.

Using memory keys can be a problem-solving activity in itself. In one particular classroom, students were asked how they might use the memory keys to evaluate expressions like

$$\left[\frac{256}{16} \times 2.5\right] - \frac{(18\times5) + (25\times3)}{3.1 \times 0.5} .$$

An interesting discussion followed each example; many different ways were presented and debated. Some very creative thought was evident!

The above examples illustrate problems where using the memory keys on a calculator can produce results in an efficient manner. Assuming that students have had extensive use of calculators in the elementary grades, teaching and encouraging the use of memory keys in middle school seems quite appropriate.

Teachers should encourage students to use the memory keys; many examples should be provided, and; opportunity for experimentation and practice need to be initiated weekly, if not daily.

References

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